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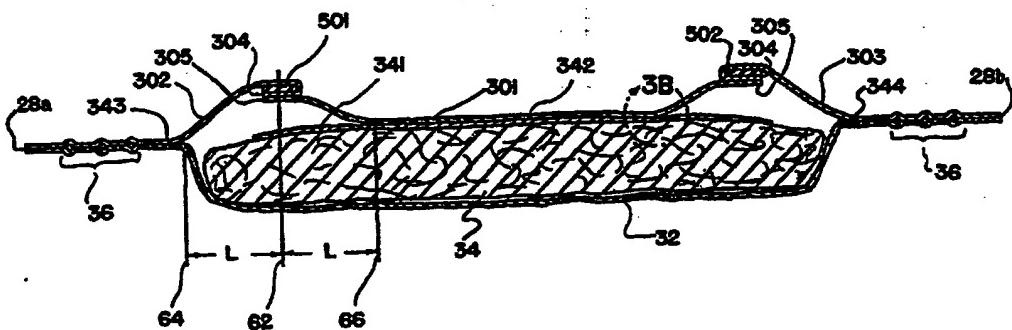
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(54) Title: ABSORBENT GARMENT WITH ELASTICIZED CONTAINMENT STRIPS



(57) Abstract

This invention is an integral disposable absorbent garment (10) comprising a top-sheet (30), a back sheet (32) associated with the top-sheet (30) and an absorbent core (34) positioned between the back sheet (32) and top-sheet (30). The top-sheet (30) includes a central top-sheet portion or panel (301) and hydrophilic portion or panel (301) and two outboard hydrophobic portions or panels (302, 303). The central portion or panel (301) and outboard portions or panels (302, 303) are operatively joined by a pair of elastic strips (501, 502) extending substantially parallel to and on opposite sides of a longitudinal centerline (60) of the absorbent garment (10). The central top-sheet portion or panel (301) is bonded to the absorbent core (34) along a bond area (342) between the elastic strips (501, 502) and the outer top-sheet portions or panels (302, 303) are bonded to the elements therebelow along bond areas (343, 344) outside the elastic strips (501, 502). The portions of the top-sheet (30) immediately below the elastic strips (501, 502) are not bonded to the elements therebelow, so the top-sheet (30) rises under the contractile force of the elastic strips (501, 502).

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## ABSORBENT GARMENT WITH ELASTICIZED CONTAINMENT STRIPS

### BACKGROUND OF THE INVENTION

#### **Field of the Invention**

5 This invention generally relates to absorbent garments, and more particularly relates to absorbent garments having at least one pair of spaced elastic strips under the topsheet to help prevent leakage, especially through openings in the sides of the garment.

#### **Description of the Prior Art**

10 A function of absorbent articles, such as diapers, diaper covers, disposable diapers, training pants and adult incontinent briefs, is to absorb and contain body exudates. Such articles are intended to prevent body exudates from soiling, wetting, or otherwise contaminating clothing or other articles, such as bedding, that come in contact with the wearer. In some situations,

15 body exudates leak out of the gaps between the absorbent article and the wearer's leg or waist to adjacent clothing because they are not immediately absorbed within the article. This is evident with loose fecal material which tends to "ride" on the top surface of the absorbent article and rapid discharges of urine.

20 Contemporary disposable diapers, such as those disclosed in U.S. Patent 3,860,003, issued to Kenneth Buell, have a topsheet, a backsheet, an absorbent core, and substantially liquid impervious elasticized leg cuffs or flaps. While liquid impervious elasticized leg flaps usually improve the ability to contain body exudates, leaks can still occur even with elasticized leg flaps. For 25 example, as fecal material (or urine) moves across the top surface of the topsheet, it tends to work its way past or over the elasticized leg flaps.

To further reduce leakage through leg openings (or the waist), a second pair of flaps have been used in absorbent garments, including two-piece diapers and disposable absorbent articles. These flaps are generally attached linearly 30 along one edge, however, sometimes the ends of the flaps are attached to the

liner so that each flap defines a waste containment pocket. These flaps are typically spaced inwardly of the leg cuffs or flaps (or located at the waist) and are elasticized with one or multiple lines of elastic. While some flaps are liquid pervious, most have been liquid impervious to maximize leakage prevention. The combination of a pair of elasticized legs cuffs and a pair of elasticized inner flaps (or flaps that define pockets) has been used for decades in absorbent garments. For example, Japanese Utility Model 41-18359 discloses such a combination in a two-piece diaper or diaper cover. Such two-piece diaper technology has been incorporated into unitary disposable diapers by those of ordinary skill in the art. For example, Buell '003 suggests incorporating leg elastics from two-piece diapers into unitary disposable diapers.

Inner flaps are generally attached to or formed from the topsheet or backsheet. Examples of inner flaps or cuffs are well known to those skilled in the art and are embodied, for example, in U.S. Patent 5,246,431 to Minetola et al. While the addition of inner cuffs such as in Minetola generally improves containment, it is not without a cost.

In general, whether they are attached to the bodyside liner or formed from the bodyside liner, inner cuffs generally require significantly more material than a basic, non-cuffed topsheet. For example, when inner cuffs are attached to the bodyside liner, they are sometimes formed from an elongated strip of material extending from the front waist region to the rear waist region. In cross section, inner cuffs attached to the bodyside liner usually are attached to the topsheet along a longitudinal edge, rise above the topsheet surface along one longitudinal side, are folded in half at their distal end, and again extend to the topsheet surface where they are attached along the other longitudinal edge. Alternatively, after being folded in half along their distal edge, the inner cuff might extend only partially along, and be adhered to, the backside of the first longitudinal side instead of extending all the way back to the topsheet.

In still further inner cuff configurations, the cuff might be formed from the bodyside liner, resembling a pair of pleats in the topsheet on opposite sides of a longitudinal centerline of the diaper. Elastics are sometimes integrated into the distal edges of the pleats which project above the surface of the 5 topsheet. Enloe, U.S. Patent 4,704,116 is an example of this type of inner cuff configuration. As with inner cuffs attached to the bodyside liner, pleated topsheets require additional topsheet material (represented by the pleats), compared with basic, non-cuffed topsheets.

It will be readily appreciated by those skilled in the art that either with 10 attached inner cuffs or pleated inner cuffs, significantly more material is required to form the topsheet. When it is born in mind that diaper manufacturers produce billions of diapers per year, the material savings becomes significant.

Other containment structures, including some requiring less material 15 than traditional inner flaps have been proposed. One such alternative is disclosed in U.S. Patent 4,808,177 to DesMarais et al., which is hereby incorporated by reference. This patent discloses a diaper having a pair of "floating" inner cuffs beneath the topsheet. The floating inner cuffs are formed from a pair of central elastic members disposed on each longitudinal side of the 20 diaper inboard of the leg elastic members. The central elastic members are bonded at the front and rear waist sections of the diaper. The diaper has two seams attaching the topsheet to the absorbent elements therebelow. The first seam is in the center longitudinal portion of the diaper between the central elastic members. The second seam is between the central elastic members and 25 the leg elastics.

Since the portion of the topsheet immediately adjacent the central elastic members is not attached to the absorbent elements therebelow except in the front and rear waist regions, the topsheet rises under the contractile forces of the central elastic members. As the elastic members pull the unbonded portions

of the topsheet away from the surface of the absorbent elements, a channel is created between the seams. According to DesMarais, the central elastic members float and ride up along the inner creases of the leg of the wearer in the crotch region, thus providing enhanced containment. Alternatively, the 5 central elastic members are affixed to the topsheet so that the topsheet and central elastic members cooperate to form floating inner cuffs.

DesMarais, however, does not appear to disclose a topsheet having outboard portions with different containment characteristics than the central portions thereof. Consequently, liquid exudates may readily pass through the 10 topsheet into the absorbent elements therebelow, migrate laterally to the edges of the absorbent garment, and pass back through the portion of the liner outboard of the absorbent, thereby contributing to leg leaks.

Another alternative containment strategy is discussed in U.S. Patent 4,883,482 to Gandrez et al. There, a disposable diaper includes two elastic 15 systems which cooperate to improve exudate containment. The first elastic system comprises two elastic bands disposed along the edge of and beneath the absorbent wad. The second elastic system is similar to conventional leg elastic systems. By positioning the first elastic system beneath the absorbent wad, user comfort is apparently increased by virtue of the buffer created by the 20 absorbent wad. While Gandrez might achieve a certain level of comfort, the gasketing effect of the first elastic system may be reduced by remotely and indirectly employing elastics relatively removed from the wearer's body.

These are but of a couple of the disadvantages of the prior art that the preferred embodiments seek to address.

25 **SUMMARY OF THE INVENTION**

Accordingly, it is an object of the present invention to prevent leakage of body exudates from an absorbent garment while minimizing the material required for the garment, including the topsheet.

It is a further object of the present invention to provide a topsheet having outboard portions or panels having different containment characteristics than the central portion or panel thereof.

It is yet a further object of the present invention to employ an elastic 5 containment device, inboard of the leg elastics, which is in relatively close proximity to the topsheet.

These and further objects are achieved by an absorbent garment comprising a topsheet, a backsheet associated with the topsheet and an absorbent core disposed between the topsheet and at least part of the backsheet.

10 At least one pair of leg elastics are positioned adjacent at least a portion of a pair of leg openings, which are located between the front and back waist portions of the absorbent garment. Additionally, at least one pair of elastic strips are disposed on opposite sides of a longitudinal centerline of the absorbent garment from the front waist region to the rear waist region or a 15 portion thereof.

Preferably, the topsheet comprises three portions or panels, including a central topsheet portion or panel and a pair of outer topsheet portions or panels disposed on either side of the central topsheet portion or panel. As used herein in connection with the description of the topsheet, the term "portion" is 20 used to denote that the topsheet comprises a single sheet of material that has portions having different characteristics (e.g. hydrophobicity/hydrophilicity and or liquid perviousness/imperviousness). The term "panel" is used herein in connection with the description of the topsheet to denote that the topsheet comprises separate sheets of materials which are connected together (directly 25 or indirectly) to form the topsheet. The central topsheet portion or panel preferably comprises a liquid pervious material that may be hydrophobic or hydrophilic. The central panel or portion preferably extends from the front waist portion to the back waist portion (or a portion thereof) and has a pair of side edges. The outer topsheet portions or panels preferably comprises a

substantially liquid impervious material that is preferably hydrophobic. The outer panels or portions preferably extend from the front waist portion to the back waist portion (or a portion thereof) and have inner edges which are adjacent to or connected with respective side edges of the central topsheet  
5 portion or panel and outer edges that are adjacent the outer edges of the absorbent garment. Preferably, the central topsheet portion or panel and the outer topsheet portions or panels are operatively joined or connected at least in part by the elastic strips. When the topsheet comprises three portions, at least two of which have different characteristics, the term operatively joined is  
10 intended to indicate that the elastic strips are preferably positioned at or near the demarcation between the topsheet portions.

The elastic strips according to one embodiment comprise substantially rectangular, elongated foam strips having a top longitudinal side, a bottom longitudinal side, an inner base side and an outer base side. The inner edges  
15 of the outer topsheet portions or panels extend over the top longitudinal side, around the inner base side and under the bottom longitudinal side of the strips. The inner edges of the outer topsheet portions or panels terminate near or beneath the bottom longitudinal side of the strips, and are secured to respective side edges of the central topsheet portion or panel.  
20

In one preferred embodiment, the topsheet is bonded to the elements therebelow in three distinct bond areas. The central topsheet portion or panel is bonded to the absorbent core (or a portion thereof) in a central bond area which is located between the strips. The outer topsheet portions or panels are bonded to the elements therebelow in respective outer bond areas which are  
25 located outboard of the strips. The portions of the topsheet on either side of and beneath the strips are not bonded to the elements therebelow. Consequently, the unbonded portions of the topsheet rise under the contractile force of the strips. The raised, unbonded portions of the topsheet form a gasket and thus helps prevent leakage.

In another preferred embodiment, the inner edges of the outer topsheet portions or panels terminate on or near respective top longitudinal sides of the strips. The outer and central topsheet portions or panels in this embodiment are bonded to the elements therebelow in three distinct bond areas. The 5 topsheet portions or panels in this embodiment also rise under the contractile force of the strips.

Other preferred embodiments of the absorbent garment include different configurations for the elastic strips. In one further embodiment, the top longitudinal side of the elastic strips have at least one and preferably a plurality 10 of nibs extending the length of the strips. The nibs enhance the gasketing effect of the strips by providing localized, but subtle, pressure points above that provided by the flat surface on the top longitudinal side of the elastic strip. In still other further embodiments, the elastic strips comprise foam strips having 15 curved or bent contours, for example, to be "C"-like in profile and operatively join the inner edges of the outer topsheet portions or panels to the side edges of the central topsheet portion or panel. The foam strip may be positioned with respect to the topsheet so that the open end of the "C"-like foam strips faces either inwardly or outwardly.

Further objects, features and aspects of this invention will be understood 20 from the following detailed description of the preferred embodiments with reference to the drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a partially cut-away plan view of the absorbent garment according to a first preferred embodiment with the elastic forces removed.

25 Figure 2 is a perspective view of the absorbent garment according to the first preferred embodiment.

Figure 3A is a cross section of the absorbent garment taken along line 3A-3A in Fig. 2.

Figure 3B is a detail taken along line 3B in Fig. 3A.

Figure 4 is an enlarged cross-sectional view showing the absorbent garment according to a first preferred embodiment.

Figure 5 is an enlarged cross-sectional view showing the absorbent garment according to a second preferred embodiment.

5 Figure 6 is an enlarged cross-sectional view showing the absorbent garment according to a third preferred embodiment.

Figure 7 is an enlarged cross-sectional view showing the absorbent garment according to a fourth preferred embodiment.

10 Figure 8 is a cross-sectional view of an elastic strip according to a fifth preferred embodiment.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

As used herein, the term "absorbent garment" refers to garments that absorb and contain body exudates, and more specifically, refers to garments which are placed against or in proximity to the body of the wearer to absorb 15 and contain the various exudates discharged from the body. A non-exhaustive list of examples of absorbent garments includes diapers, diaper covers, disposable diapers, training pants, feminine hygiene products and adult incontinent briefs. The term "disposable absorbent garment" refers to absorbent garments that are intended to be discarded or partially discarded after 20 a single use (i.e., they are not intended to be laundered or otherwise restored or reused). The term "unitary disposable absorbent garment" refers to a disposable absorbent garment that is essentially a single structure (i.e., it does not require separate manipulative parts such as a diaper cover and insert.) As used herein, the term "diaper" refers to an absorbent garment generally worn 25 by infants and incontinent persons about the lower torso.

A preferred embodiment of the invention comprises a disposable absorbent garment 10, as shown in FIG. 1. It should be understood, however, that the present invention is applicable to other types of absorbent garments. For simplicity, the invention will be described in terms of a diaper. With

reference to Figure 1, the diaper 10 according to a first preferred embodiment has a generally hourglass shape and can generally be defined in terms of a front waist region 22, a back waist region 24 and a crotch region 26. A pair of leg openings 28a, 28b extend along at least a portion of the crotch region 26. The 5 diaper preferably comprises a topsheet 30, a backsheet 32, which may be substantially coterminous with the topsheet 30, an absorbent core 34 disposed between at least a portion of the topsheet 30 and backsheet 32, one or more pairs of leg elastics 36 (three pairs are shown in Fig. 1) extending adjacent the leg openings 28a, 28b, respectively, a front waist elastic system 38a, a back 10 waist elastic system 38b, a fastening system 40 (e.g., tape or VELCRO) and a waste containment system 50 in the form of one or more pairs of elastic strips 501, 502, preferably foam strips. The strips 501, 502 are disposed between the topsheet and backsheet, and preferably between the absorbent and topsheet. The strips preferably extend from the front waist region 22 to the 15 back waist region 24 along opposite sides of a longitudinal centerline 60 of the diaper 10. The front waist region 22 and rear waist region 24 include ear portions 221, 241 extending outwardly from the leg openings 28a, 28b.

With reference to Figure 3A in conjunction with Figure 1, the topsheet 30 is preferably formed of three separate panels. The first panel comprises a 20 central topsheet panel 301. Preferably, the pair of strips 501, 502 are disposed at the side edges of the central topsheet panel 301. The central topsheet panel 301 is preferably a liquid pervious material that is either hydrophobic or hydrophilic. The central topsheet panel may be made from any number of materials, including synthetic fibers (e.g., polyester or polypropylene fibers), 25 natural fibers (e.g., wood or cellulose), apertured plastic films, reticulated foams and porous foams to name a few. One preferred material for the central topsheet panel 301 is a coverstock of single ply nonwoven material which may be made of carded fibers, either adhesively or thermally bonded, perforated plastic film, spun bonded fibers, or water entangled fibers, which generally

weigh from 0.3-0.7 oz./sq. yd. and have appropriate and effective machine-direction and cross-machine direction strength suitable for use as a baby diaper coverstock material. The central topsheet panel 301 preferably extends from substantially the front waist region 22 to the back waist region 24 or a portion thereof.

The second and third topsheet panels 302, 303 are positioned laterally outside the central topsheet panel 301. The outer topsheet panels 302, 303 are preferably substantially liquid impervious and hydrophobic. The outer edges of panels 302, 303 may substantially follow the corresponding outer perimeter of the backsheets 32. The outer topsheet panels 302, 303 include inner edges 304 which, in the embodiment depicted in Figure 3A, are adhesively secured to the side edges 305 of the central topsheet panel 301. The material for the outer topsheet portions or panels 302, 303 is preferably polypropylene and can be woven, nonwoven, spunbonded, carded, or the like, depending on the application.

Absorbent core 34 is preferably positioned beneath at least the central topsheet panel 301 (or a portion thereof), and more preferably is also positioned beneath a portion of the outer topsheet panels 302, 303. A substantially rectangular tissue layer 341 optionally may be used to overlay the absorbent core 34 in a well known manner. Alternatively, the tissue layer 341 may be omitted or could entirely surround the absorbent core 34. While the absorbent core 34 is shown as having a somewhat hourglass shape, other shapes are within the scope of the preferred embodiments. For example, the absorbent core 34 may have a rectangular shape of substantially the same size as the central topsheet panel 301 or an asymmetric shape.

Examples of suitable materials for the absorbent core 34 include creped cellulose wadding, absorbent foams, absorbent sponges, super absorbent polymers, absorbent gelling materials, fiberized cellulose, fluff pulp having tissue or synthetic materials between the core 34 and the hydrophilic topsheet

301 or any equivalent material or combination of materials. Moreover, the tissue 341 and/or synthetic material in the core 34 may or may not extend outboard of the strips 501, 502 or be substantially coextensive therewith. The size and capacity of the absorbent material should correspond to the 5 application, i.e., an incontinent brief for an adult requires a larger absorbent core than a diaper for a child. Zoned absorbency may also be used if desired. For example, more absorbency may be used in particular regions depending on the gender of the intended wearer.

A backsheet 32 is associated with the topsheet 30. As used herein, the 10 term "associated" encompasses configurations whereby the topsheet 30 is directly joined to the backsheet 32 by affixing the topsheet 30 directly to the backsheet 32, and configurations whereby the topsheet 30 is indirectly joined to the backsheet 32 by affixing the topsheet 30 through intermediate members which in turn are affixed to the backsheet 32. The backsheet 32 may be made 15 from a low density polyethylene about 0.01 mm. to about 0.3 mm. thick, preferably with a thickness of about 0.03 mm. Other backsheet materials will be readily apparent to those skilled in the art. A backsheet having a longitudinal dimension of about 45 cm., a transverse dimension at the front and back waist regions 22, 24 of about 32 cm. and a transverse dimension through 20 the central crotch region 26 of about 20 cm. is suitable for one application. While the backsheet 32 and topsheet 30 in the preferred embodiment have substantially the same dimensions, they may also have different dimensions.

In addition, the backsheet 32 may be covered with a fibrous nonwoven fabric such as is disclosed in U.S. Patent 4,646,362 to Heran, which is hereby 25 incorporated by reference. Materials for such a fibrous outer liner include a spun-bonded nonwoven web of synthetic fibers such as polypropylene, polyethylene or polyester fibers; a nonwoven web of cellulosic fibers, textile fibers such as rayon fibers, cotton and the like, or a blend of cellulosic and textile fibers; a spun-bonded nonwoven web of synthetic fibers such as

polypropylene, polyethylene or polyester fibers mixed with cellulosic, pulp fibers, or textile fibers; or melt blown thermoplastic fibers, such as macrofibers or microfibers, of polypropylene, polyethylene, polyester or other thermoplastic materials or mixtures of such thermoplastic macrofibers or microfibers with  
5 cellulose, pulp or textile fibers. The fibrous backing sheet is particularly suitable in training pants applications since, while the child is still protected against accidents, the training pants have the look and feel of cloth.

The underlying structure beneath the topsheet 30 can include, depending on the diaper construction, various combinations of elements. For example,  
10 the underlying structure beneath the topsheet 30 might include the following combinations of elements: a backsheet; a backsheet and an absorbent core; a backsheet, an absorbent core and a tissue layer; a backsheet, a fibrous non-woven layer, an absorbent core and a tissue layer; to name a few. Moreover, depending on the particular location on the topsheet, the underlying structure  
15 might differ even in the same diaper. This is apparent, for example, in Figure 3A wherein the underlying structure beneath the central topsheet portion or panel 301 proximate to the longitudinal centerline 60 includes backsheet 32, absorbent core 34 and tissue layer 341, whereas proximate to the leg openings 28a, 28b, the underlying structure includes backsheet 32 and leg elastics 36.  
20 As used herein, the term "underlying structure" refers generally the foregoing elements alone or in combination, unless otherwise specified.

Each leg opening 28a, 28b is provided with a leg elastic containment system 36. In the preferred embodiment, three strands of elastic threads are positioned to extend adjacent the leg openings 28a, 28b between the outer  
25 topsheet portions or panels 302, 303 and the backsheet 32. Any suitable elastomeric material exhibiting at least an elongation (defined herein as  $L_s - L_r/L_r$  where  $L_s$  is the stretched length of an elastic element and  $L_r$  is retracted length, multiplied by 100 to obtain percent elongation) in the range of 5% to 350%, preferably in the range of 200% to 300%, can be employed for the leg

elastics 36. The leg elastics 36 may be attached to the diaper 10 in any of several ways which are known in the art. For example, the leg elastics 36 may be ultrasonically bonded, heat/pressure sealed using a variety of bonding patterns, or glued to the diaper 10.

5 Various commercially available materials can be used for the leg elastics 36, such as natural rubber, butyl rubber or other synthetic rubber, urethane elastomeric material such as that available from B. F. Goodrich Co. under the trademark TUFTANE, and elastomeric material available from H.B. Fuller Co. under the tradename FULLASTIC. The latter material (see e.g., U.S. Pat.  
10 No. 4,418,123) is based upon thermoplastic elastomeric copolymers of the A-B-A type such as those available from Shell Chemical Co. under the trademark KRATON which have a rubbery midblock such as butadiene or isoprene and polystyrene end blocks, and is especially useful because it is a self-adhesive material and can be applied to the portions or panels of the garment without  
15 additional adhesive between the elastic means and the portions or panels.

The fastening system 40 of the preferred embodiments is attached to the back waist region 24, and preferably comprises tape tab or VELCRO fasteners 401. However, any known fastening system known in the art will be acceptable. Moreover, the fastening system 40 may include a reinforcement patch below the front waist portion so that the diaper may be checked for soiling without compromising the ability to reuse the fastener. Alternatively,  
20 other diaper fastening systems are also possible, including safety pins, buttons, and snaps.

Waist elastics 38a, 38b may be similar structures or different to impart  
25 similar or different elastic characteristics to the front and back waist portions of the diaper. In general, the waist elastics may comprise foam strips 38 positioned at the front and back waist sections 22, 24. The foam strips 38 are preferably about  $\frac{1}{2}$  to  $1\frac{1}{2}$  inches wide and about three to six inches long. The foam strips 38 are preferably positioned between the topsheet portions or panels

301, 302, 303 and the backsheets 32. The foam strips 38 are preferably polyurethane, but could be any other suitable material which decreases waistband roll over, reduces leakage over the waist ends of the absorbent garment, and generally improves comfort and fit. The front and back waist  
5 foam strips 38a, 38b are stretched 50-150%, preferably 100%, before being adhesively secured between the backsheets 32 and topsheet 30.

As best seen in Figures 1 and 2, one or more pairs of elastic strips 501, 502 extend from the front waist region 22 to the back waist region 24 on opposite sides of a longitudinal centerline 60 of the diaper 10. Preferably, the  
10 elastic strips are located in the region where the central topsheet panel 301 is operatively joined to the outer topsheet panels 302, 303. As used herein, the term "operatively joined" refers to two or more components which are directly or indirectly attached.

With reference to Figure 4 in conjunction with Figures 1-3, the elastic  
15 strips 501, 502 according to the first preferred embodiment are elongated, essentially flat strips which include a top longitudinal side 503, a bottom longitudinal side 504, an inner base side 505 and an outer base side 506. The elastic strips 501, 502 have base sides 505, 506 of about 1/1000" thick and longitudinal sides 503, 504 of about 375/1000". For purposes of illustration,  
20 the preferred thickness of the elastic strips 501, 502 have been exaggerated in the figures. That is not to say, however, that the elastic strips could not be as relatively thick as they are shown in the Figures. Moreover, it will be readily appreciated that the wider the longitudinal sides 503, 504, the better the gasketing against the buttocks and genital area of the wearer.

25 The inner edges 304 of the outer topsheet panels 302, 303 preferably at least partially surround the elastic strips 501, 502 by extending over the top longitudinal side 503, around the inner base side 505, and under the bottom longitudinal side 504. The inner edges 304 of the outer topsheet portions or panels 302, 303, after wrapping around the elastic strips 501, 502, preferably

terminate at or near the outer base sides 506 of the elastic strips 501, 502. Optionally, the inner edges of the outer topsheet panels may further extend either partially or entirely around base side 506. The elastic strips 501, 502 preferably overlay the side edges 305 of central topsheet panel 301. The 5 central topsheet portion or panel 301 and the outer topsheet portions or panels 302, 303 are operatively joined, preferably in the vicinity of the elastic strips 501, 502. Specifically, the bottom surface of the outer topsheet panels 302, 303 beneath the elastic strips 501, 502 is secured to the subjacent side edge portion 305 of the central topsheet portion or panel 301. Methods of securing 10 the bottom surface of the outer topsheet portions or panels 302, 303 beneath the elastic strips 501, 502 to the subjacent side edge portion 305 of the central topsheet panel 301 include ultrasonic bonding, hot melt adhesives and heat or pressure sealing. If desired, the top longitudinal sides of the elastic strips 501, 502 may also be attached to the outer panels 302, 303.

15 The elastic strips 501, 502 may be manufactured from a number of materials which exhibit elastic properties when applied to the topsheet 30. For example, the elastic strips 501, 502 may be manufactured from polyester foam, latex rubber foam, polyurethane, foam, rubber elastic, natural rubber, or any other equivalent elastic material. The elastic strips 501, 502, when applied, 20 extend on opposite sides of and preferably parallel to a longitudinal centerline 60 of the diaper 10. The elastic strips 501, 502 are preferably substantially equally spaced from the longitudinal centerline 60. Additionally, the elastic strips 501, 502 are preferably stretched from about 100-500%, preferably 200%, when applied to the topsheet 30. Since the elastic strips 501, 502 25 according to the preferred embodiments are relatively thin, they may become slightly corrugated after they are encased. It will be readily appreciated by those skilled in the art, however, that as the thickness of the base sides 505, 506 of the elastic strips is increased, the elastic strips remain more rectangular when surrounded or partially surrounded.

As seen in Figures 3A and 3B, the topsheet panels 301, 302, 303 and the underlying structure may be selectively bonded in three distinct areas. First, the central topsheet portion or panel 301 is bonded (preferably over an extended area) at 342 to the tissue layer 341 and/or absorbent core 34. The 5 area of attachment may extend along an area substantially symmetric to the longitudinal centerline 60 of the diaper. The areas adjacent the side edges of the central topsheet panel 301 are preferably not bonded to the absorbent core 34 and tissue layer 341. The other two bond areas are preferably outside of the respective elastic strips 501, 502 in the area between the elastic strips 501, 10 502 and the leg opening 28a, 28b. In particular, the outer topsheet panels 302, 303 may be bonded to the backsheet 32 as seen by bond areas 343, 344. Alternatively, the bond areas may be on or near the edge of the absorbent 34. However, the inner edges 304 of the outer topsheet portions or panels 302, 303 which surround the elastic strips 501, 502 may be free of attachment to the 15 elements therebelow.

In a still further alternative embodiment, the portion of the topsheet 30 between the elastic members 501, 502, e.g., the central topsheet portion or panel 301, may be bonded to the underlying structure by a plurality of bond areas, preferably two bond areas 342. In this alternative embodiment, each 20 elastic member 501, 502 is positioned between a pair of bond areas 342 and 343, one of which is outboard and one of which is inboard, respectively, of each elastic member 501, 502. The central portion (i.e., extending on either side of the longitudinal centerline 60) of the central topsheet panel or portion 301 is unbonded in this alternative embodiment. Consequently, when a 25 plurality of bond areas are used, less bonding is generally required than when using one continuous bonded area extending on either side of the longitudinal centerline 60.

In each of the preferred embodiments, the central topsheet portion or panel 301 and outer topsheet portions or panels 302, 303 are preferably bonded

to the elements therebelow at 342, 343, 344 with adhesive glue, but could be spot glued, ultrasonically bonded, or secured in any other manner known in the art.

With reference to Figure 3A, there is depicted a line 62 perpendicular to and bisecting the top and bottom longitudinal sides of the elastic strip 501. Line 64 is parallel to line 62 and intersects the inner edge of the bonded area 343 between the backsheet 32 and outer topsheet panel 302. Line 66 is also parallel to line 62 and intersects the outer edge of the bonded area 342 between the central topsheet panel 301 and the tissue layer 341. In use or before the product is placed on the user, it will be recognized that elastic strip 501 might assume a slightly inwardly directed orientation, i.e., as if rotating clockwise in Fig. 3A. For the purposes of this discussion, it will be assumed that, if necessary, the elastic strip 501, for the purpose of obtaining lines 62, 64, 66, has been oriented so that its bottom and top longitudinal sides is substantially parallel to the surface of the topsheet 30.

The distance L between line 62 and line 64 is preferably substantially the same as the distance L between line 62 and line 66. Distances L, L are preferably  $\frac{1}{2}$  to 1 inch, but could be smaller or larger, depending upon how high it is desired for elastic strips 501, 502 to rise above the surface of the topsheet 30. By constructing the absorbent garment so that the distances L, L are substantially the same, the elastic strip 501 tends to assume a more anatomically correct orientation, thus improving the gasketing effect between the buttocks and genital area of the wearer. While the discussion regarding distances L, L have been with respect to elastic strip 501, elastic strip 502 is also configured so that it is preferably equally spaced between its respective bond areas. In addition, the alternative embodiments discussed below also are preferably constructed so that the elastic strips 501, 502 in those embodiments are positioned midway between their respective bond areas. However, depending on the application, it might be desirable to modify the containment

characteristics by causing the foam strips to rotate clockwise or counterclockwise. One method of doing so would be to position elastic strips 501, 502 so that they are not equally spaced between their respective bond areas.

5 If the portions of the central topsheet panel 301 and outer topsheet panels 302, 303 in the vicinity of the elastic strips 501, 502 are not bonded to subjacent elements, the tensioned elastic strips 501, 502 contract and cause the unbonded portions of the topsheet 30 to rise above the absorbent core 34. In use, the elastic strips 501, 502 cause a gasketing effect with the wearer's body  
10 as they rise above the bonded portions. The elastic strips 501, 502 and the raised portions of the central topsheet panel 301 and outer topsheet panels 302, 303 cooperate to prevent leakage through the leg openings.

With reference to Figure 5, there is shown a second preferred embodiment. The second embodiment is similar to the first embodiment in  
15 most respects except that the inner edges 304 of the outer topsheet panels 302, 303 terminate on a predetermined portion of the upper longitudinal side 503 of the elastic strips 501, 502 (preferably the innermost edge thereof). The elastic strips 501, 502 are secured, preferably adhesively, to the inner edge 304 of the outer topsheet panels 302, 303 and to the side edge 305 of the central topsheet  
20 panel 301. Thus, in the second embodiment, the elastic strips 501, 502 are only partially surrounded, which further reduces the amount of topsheet material needed. As with the first embodiment, the portions of the topsheet 30 on either side of the elastic strips 501, 502 are preferably not secured to the subjacent elements, so the topsheet rises under the contractile force of the  
25 elastic strips 501, 502.

With reference to Figure 6, there is shown a third preferred embodiment. In this embodiment, the elastic strips 501, 502 are preferably folded substantially in half along their longitudinal axes to form a "C"-like profile. Optionally, the two "halves" may be attached (adhesively or

otherwise) to one another. The "C"-like elastic strips have top and bottom longitudinal sides 503, 504, a base side 505 and an open side 506. The open sides 506 of the "C"-like elastic strips, in the third embodiment, face away from the longitudinal centerline 60 of the diaper, i.e., toward the leg openings 28a, 28b. As with the first embodiment, the inner edges 304 of the outer topsheet panels 302, 303 extend around the top longitudinal side 503, around the base side 505 and under at least a portion of the bottom longitudinal side 504 of the "C"-like elastic strips, thereby substantially surrounding the elastic strips. Alternatively, the inner edges 304 of the outer topsheet portions or panels 302, 303 could terminate on a predetermined portion of the top longitudinal side 503 of the elastic strips, thereby using less topsheet material. If the portions of the topsheet 30 on either side of the elastic strips are not secured to subjacent elements, the topsheet 30 rises under the contractile force of the elastic strips 501, 502.

15 A fourth preferred embodiment is shown in Figure 7. In this embodiment, the elastic strips 501, 502 are preferably folded substantially in half along their longitudinal axes to form a "C"-like profile. Optionally, the two "halves" may be attached (adhesively or otherwise) to one another. The "C"-like elastic strips, have top and bottom longitudinal sides 503, 504, a base side 506 and an open side 505. The open sides 505 of the "C"-like elastic strips, in the fourth embodiment, face toward the longitudinal centerline 60 of the diaper, i.e., away from the leg openings 28a, 28b. The inner edges 304 of the outer topsheet panels 302, 303 extend around the top longitudinal side 503, around the open side 505 and under the bottom longitudinal side 504 of the "C"-like elastic strips, thereby substantially surrounding the elastic strips. Alternatively, the inner edges 304 of the outer topsheet portions or panels 302, 303 could terminate on a predetermined portion of the top longitudinal side 503 of the elastic strips to use less topsheet material. If the portions of the topsheet 30 on either side of the elastic strips 501, 502 are not secured to subjacent

elements, the topsheet 30 rises under the contractile force of the elastic strips 501, 502.

With reference to Figure 8, there is shown a cross-sectional view of an elastic strip in accordance with a fifth preferred embodiment. The elastic strips 5 according to this embodiment, only one of which is shown in Figure 8, comprise a top longitudinal side 503, a bottom longitudinal side 504 and base sides 505, 506. At least one, and preferably a plurality of nibs 507 extend from the top longitudinal side 503. Nibs 507 preferably extend the entire length of elastic strips 501, 502. Nibs 507 enhance the gasketing effect of the 10 elastic strips by creating localized, but subtle, pressure points above that provided by the flat surface on the top longitudinal side 503 of the elastic strip. As with the previous embodiments, the inner edges of the outer topsheet panels or portions extend around the top longitudinal side 503, around base side 505 and under the bottom longitudinal side 504, thereby substantially surrounding 15 the elastic strip. Alternatively, the inner edge of the outer topsheet panels or portions thereof could terminate on a predetermined portion of the top longitudinal side of the elastic strips to use less material.

The elastic strips 501, 502 of the foregoing embodiments are preferably bonded to the topsheet panels or portions 301, 302, 303 by spray adhesive. 20 Alternatively, elastic strips 501, 502 could be bonded to the topsheet panels or portions 301, 302, 303 by slot coating or any other bonding technique known in the art.

In any or all of the foregoing embodiments, the topsheet may comprise a single sheet of material having different characteristics (e.g. liquid 25 imperviousness/perviousness and or hydrophobicity/hydrophilicity) and have regions of transition or demarcation therebetween. In this situation, the elastic strips may be simply attached to the topsheet at these regions. In all of the foregoing embodiments, the elastic strips may be located inwardly of the

outermost edges of the absorbent, along the outermost edges of the absorbent or outwardly of the outermost edges of the absorbent.

The invention has been described in connection with the preferred embodiments. These embodiments, however, are merely for example only and 5 the invention is not restricted thereto. It will be understood by those skilled in the art that other variations and modifications can easily be made within the scope of the invention as defined by the appended claims.

**WE CLAIM:**

1. An integral disposable absorbent garment having a front waist region, a back waist region, a crotch region disposed between the front waist region and the back waist region, and a pair of leg openings adjacent the crotch region, the absorbent garment comprising:
  - 5 a topsheet comprising a central pervious portion or panel and a pair of outboard portions or panels positioned laterally outside said central pervious portion or panel;
  - a backsheet associated with said topsheet;
- 10 an absorbent core at least partially disposed between said topsheet and said backsheet;
- leg elastics associated with said leg openings; and
- 15 a pair of spaced elastic members operatively joining said central pervious portion or panel and said outboard portions or panels and positioned inboard of said leg elastic members, said spaced elastic members extending at least through the crotch area.
2. The absorbent garment of claim 1 further comprising an interconnection between said topsheet and the underlying structure comprising:
  - 20 a first bonded area outside each of said spaced elastic members; and
  - at least a second bonded area between said pair of spaced elastic members.
3. The absorbent garment of claim 2, wherein said interconnection between said topsheet and said underlying structure is an adhesive interconnection.
4. The absorbent garment of claim 2, wherein the portion of said topsheet adjacent and beneath said pair of spaced elastic members is unbonded to said underlying structure so that the unbonded portion of said topsheet rises above the bonded portion of said topsheet.

5. The absorbent garment of claim 2, further comprising a third bond area between said pair of elastic members and an unbonded portion between said second and third bond areas.
6. The absorbent garment of claim 2, said elastic members substantially 5 equally spaced between respective inner edges of said first bond area and respective outer edges of said at least a second bond area.
7. The absorbent garment of claim 1, said spaced elastic members extending substantially from the front waist region to the back waist region.
8. The absorbent garment of claim 1, said pair of spaced elastic members 10 each comprising a substantially rectangular elongated elastic strip having a top longitudinal side, a bottom longitudinal side and base sides.
9. The absorbent garment of claim 8, said central pervious portion or panel having side edges and said outboard portions or panels having inner edges, said inner edges of said outboard portions or panels secured to respective top 15 longitudinal sides of said spaced elastic members and said side edges of said central pervious portion or panel secured to respective bottom longitudinal sides of said spaced elastic members.
10. An absorbent garment comprising a topsheet, a backsheet associated with said topsheet, leg elastics provided adjacent leg openings defined at 20 opposite sides of a crotch area, an absorbent core operatively positioned between said topsheet and said backsheet, a pair of elastic containment means associated with said topsheet for containing body exudates, wherein:
  - 25 said topsheet comprises a central portion or panel and a pair of outboard portions or panels laterally outside said central portion or panel;
  - said pair of elastic containment means are positioned substantially equally spaced on opposite sides of a longitudinal centerline of the absorbent garment and extend at least through the crotch area and operatively join said central portion or panel with said outboard portions or panels in at least the crotch area; and wherein

said topsheet is bonded to the underlying structure in at least a portion of the crotch area between said pair of elastic containment means such that the unbonded portions of said topsheet rise above the bonded portions of said topsheet.

5 11. An integral disposable absorbent garment having a front waist region, a back waist region, a crotch region disposed between the front waist region and the back waist region, and a pair of leg openings adjacent the crotch region, the integral disposable absorbent garment comprising:

a topsheet comprising a central portion or panel having side edges and  
10 a pair of outboard portions or panels having inner edges;

a backsheet associated with said topsheet;

an absorbent core at least partially disposed between said topsheet and  
said backsheet;

leg elastics associated with said leg openings; and

15 a pair of spaced elastic members operatively joining said central portion or panel and said outboard portions or panels in at least the crotch area.

12. The absorbent garment of claim 11, said central portion or panel comprising a hydrophilic nonwoven material and said outboard portions or panels comprising a hydrophobic nonwoven material.

20 13. The absorbent garment of claim 11, said spaced elastic members positioned inboard of said leg elastics.

14. The absorbent garment of claim 11, said spaced elastic members substantially equally spaced from and extending parallel to a longitudinal centerline of the absorbent garment.

25 15. The absorbent garment of claim 11, said spaced elastic members each comprising a substantially rectangular elongated elastic strip having a top longitudinal side, a bottom longitudinal side and base sides.

16. The absorbent garment of claim 15, said inner edges of said outboard portions or panels secured to respective top longitudinal sides of said spaced

elastic members and said side edges of said central portion or panel secured to respective bottom longitudinal sides of said spaced elastic members.

17. The absorbent garment of claim 11, said spaced elastic members secured to said portions or panels of said topsheet by adhesive bonding.

5 18. The absorbent garment of claim 11, each of said spaced elastic members comprising a substantially "C" shaped elongated elastic strip having a top longitudinal side, a bottom longitudinal side and an open side.

19. The absorbent garment of claim 18, said inner edges of said outboard portions or panels secured to respective top longitudinal sides of said "C" 10 shaped elastic strips and said side edges of said central portion or panel secured to respective bottom longitudinal sides of said "C" shaped elastic strips.

20. The absorbent garment of claim 19, said pair of "C" shaped elastic strips secured to said topsheet such that the open sides of the substantially "C" shaped strips face a longitudinal centerline of the absorbent garment.

15 21. The absorbent garment of claim 19, said pair of "C" shaped elastic strips secured to said topsheet such that the open sides of the substantially "C" shaped strips face away from a longitudinal centerline of the absorbent garment.

22. The absorbent garment of claim 11, said spaced elastic members each 20 comprising a substantially rectangular elongated strip having a top longitudinal side, a bottom longitudinal side and base sides, said outboard portions or panels of said topsheet substantially encase said spaced elastic members by respectively extending over said top longitudinal side, around an inward base side, and beneath said bottom longitudinal side.

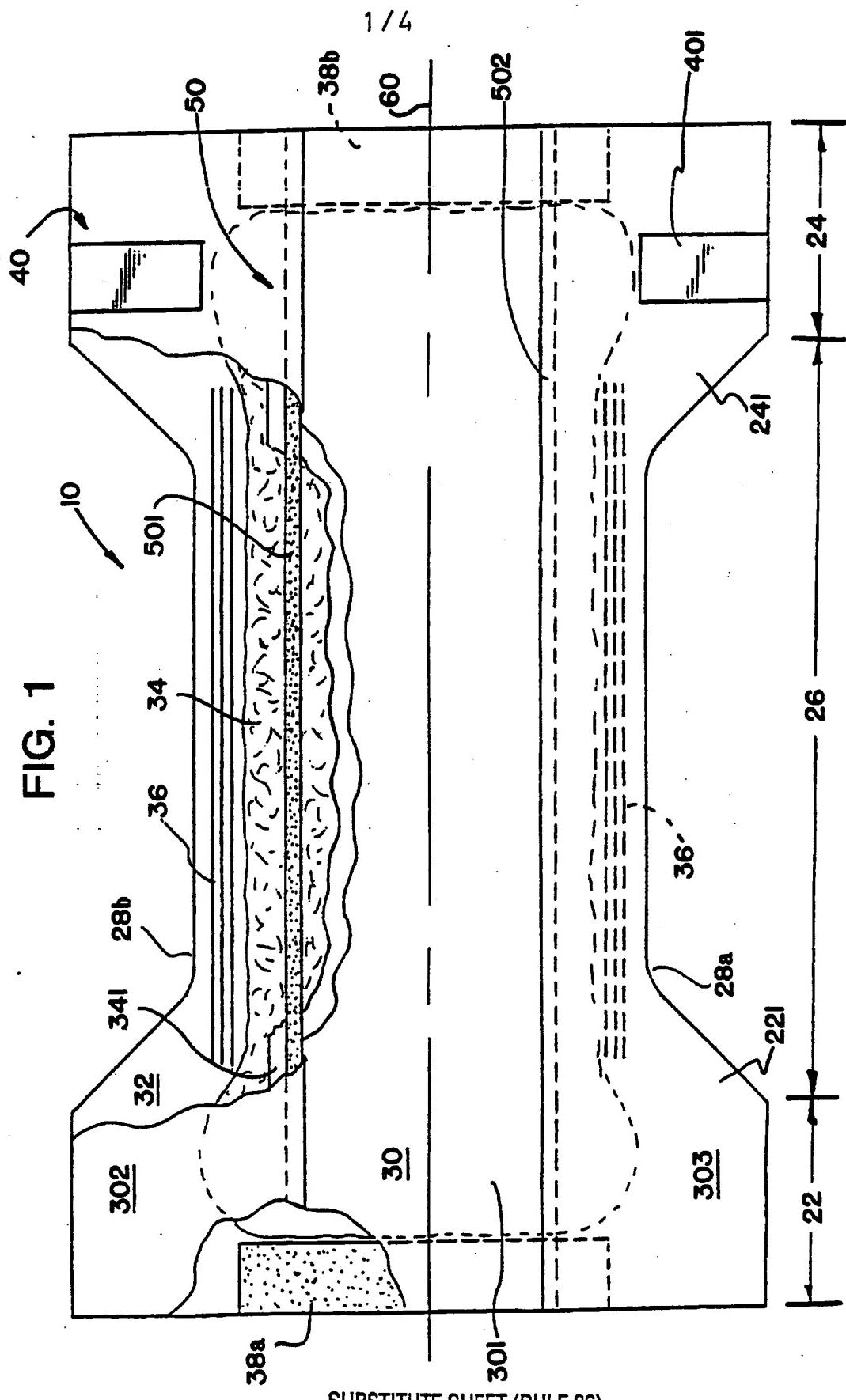
25 23. The absorbent garment of claim 11, said outboard portions or panels of said topsheet bonded directly to said backsheet at least in the crotch region.

24. The absorbent garment of claim 11, said outboard portions or panels of said topsheet operatively joined to said absorbent core through bonding in the front waist region.

25. The absorbent garment of claim 11, said central portion or panel of said topsheet bonded directly to said absorbent core.
26. The absorbent garment of claim 11, said central portion or panel of said topsheet bonded indirectly to said absorbent core.
- 5 27. An integral disposable absorbent garment having a front waist region, a back waist region, a crotch region disposed between the front waist region and the back waist region, and a pair of leg openings adjacent the crotch region, the integral disposable absorbent garment comprising:
  - a topsheet;
- 10        a backsheet associated with said topsheet;
- an absorbent core at least partially disposed between said topsheet and said backsheet and partially secured to said topsheet; and
- a pair of spaced elastic members secured to said topsheet on substantially opposite sides of a longitudinal centerline of the absorbent
- 15        garment, said spaced elastic members secured to said topsheet in an elastically tensed state along a portion of the unsecured portions of said topsheet so that when said spaced elastic members contract, the unsecured portion of said topsheet rises above said secured portion; wherein
- said pair of spaced elastic members comprises an elastic foam strip.
- 20 28. The absorbent garment of claim 27, said topsheet comprising a central nonwoven portion or panel and outboard nonwoven portions or panels.
29. The absorbent garment of claim 28, said pair of spaced elastic members operatively joining said central nonwoven portion or panel and said outboard nonwoven portions or panels.
- 25 30. The absorbent garment of claim 28, said central nonwoven portion or panel comprising a hydrophilic material and said outboard nonwoven portions or panels comprising a hydrophobic material.
31. The absorbent garment of claim 27, said spaced elastic members extending from substantially the front waist region to the back waist region.

32. The absorbent garment of claim 27, said spaced elastic members extending on opposite sides of the longitudinal centerline at least through the crotch area.
33. The absorbent garment of claim 27, further comprising leg elastics associated with said leg openings.  
5
34. The absorbent garment of claim 27, said topsheet comprising a central portion or panel having side edges and a pair of outboard portions or panels having inner edges.
35. The absorbent garment of claim 34, said pair of spaced elastic members operatively joining said central portion or panel and said outboard portions or panels.  
10
36. The absorbent garment of claim 35, said pair of spaced elastic members comprising a substantially rectangular elongated elastic strip having a top longitudinal side, a bottom longitudinal side, an inner base side and an outer base side.  
15
37. The absorbent garment of claim 36, said inner edges of said outboard portions or panels secured to respective top longitudinal sides of said spaced elastic members and said side edges of said central portion or panel secured to respective bottom longitudinal sides of said spaced elastic members.
- 20 38. The absorbent garment of claim 36, said outboard portions or panels of said topsheet substantially encase said spaced elastic members by respectively extending over said top longitudinal sides, around said inner base sides and beneath said bottom longitudinal sides.
39. The absorbent garment of claim 34, each of said spaced elastic members comprising a substantially "C" shaped elongated elastic strip having a top longitudinal side, a bottom longitudinal side and an open side, wherein said inner edges of said outboard portions or panels are secured to respective top longitudinal sides and said side edges of said central portion or panel are secured to respective bottom longitudinal sides.  
25

40. The absorbent garment of claim 39, said pair of "C" shaped elastic strips secured to said topsheet such that the open sides of the substantially "C" shaped strips face toward the longitudinal centerline of the absorbent garment.
41. The absorbent garment of claim 39, said pair of "C" shaped elastic strips secured to said topsheet such that the open sides of the substantially "C" shaped strips face away from the longitudinal centerline of the absorbent garment.

**FIG. 1**

SUBSTITUTE SHEET (RULE 26)

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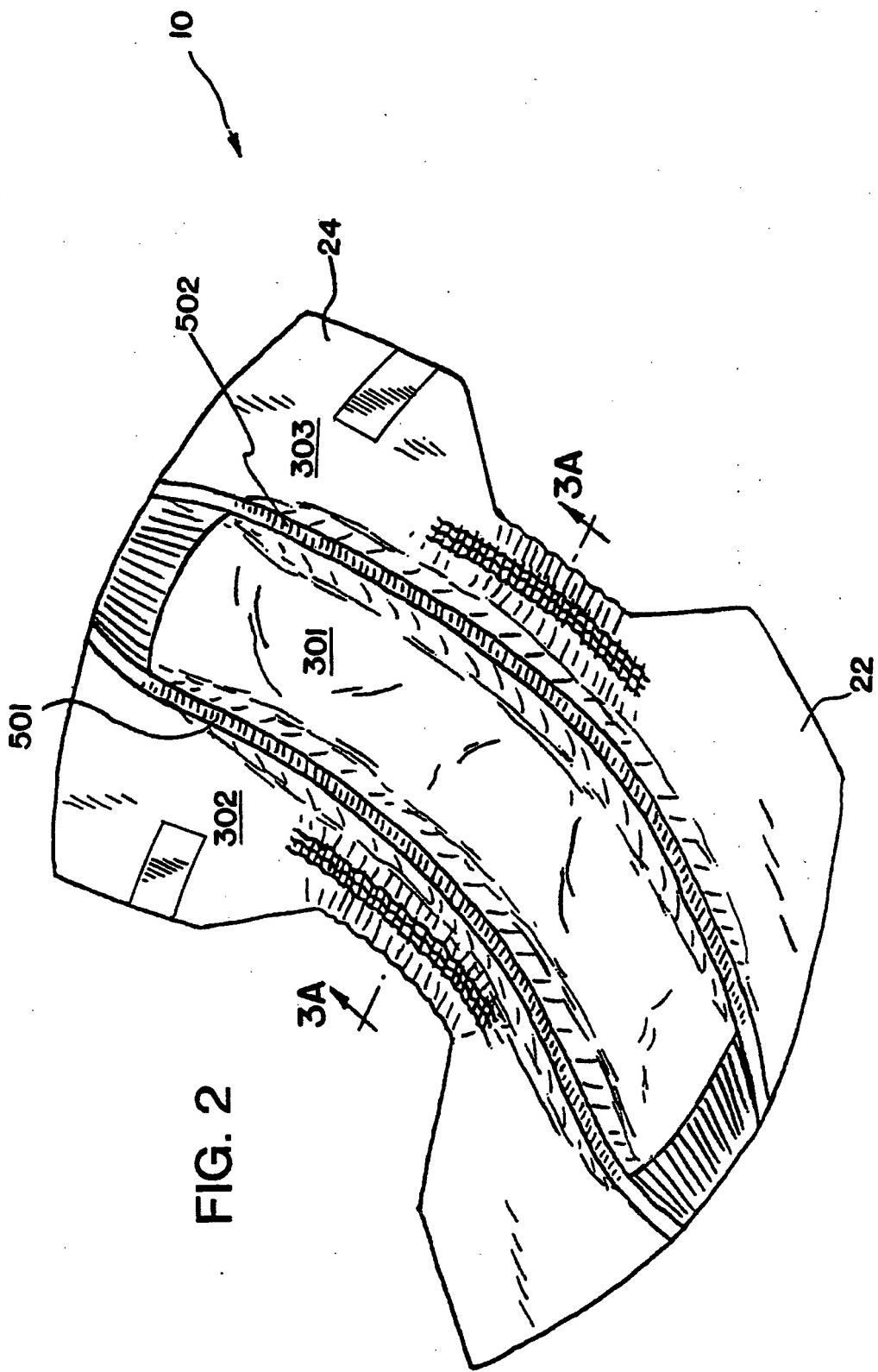


FIG. 2

SUBSTITUTE SHEET (RULE 26)

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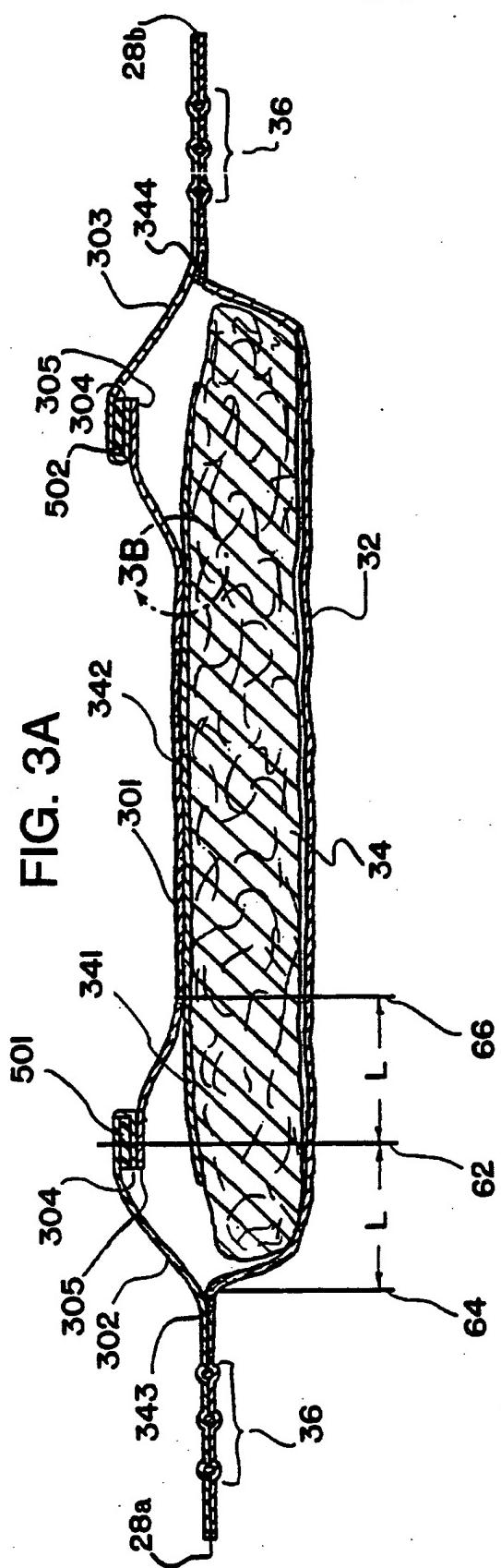
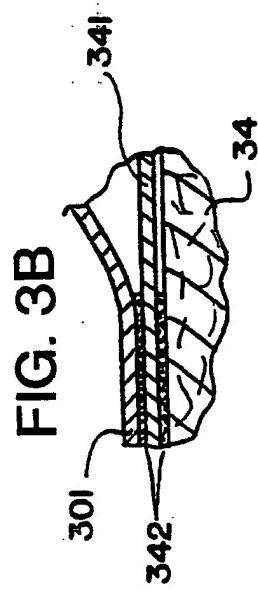
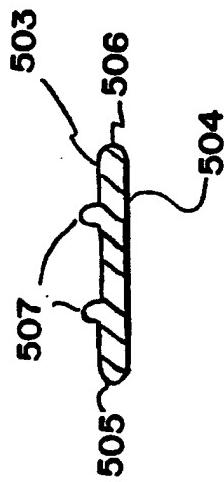
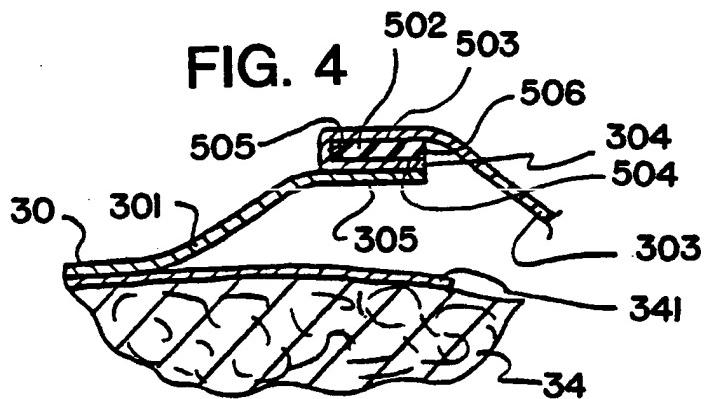
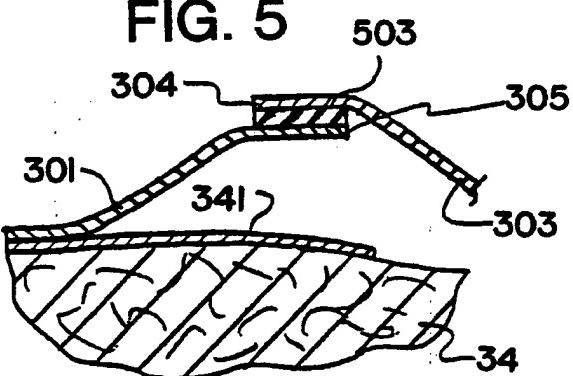
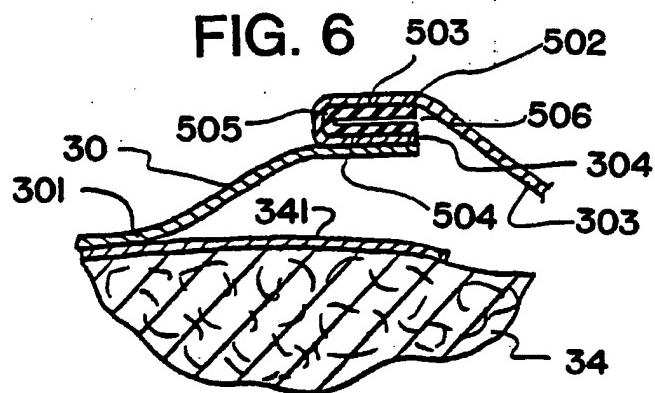
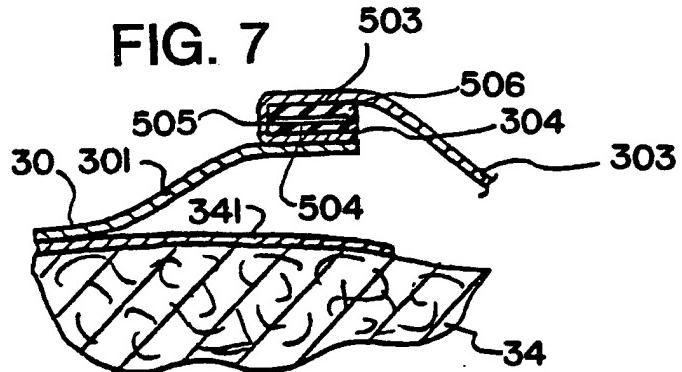


FIG. 8



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**FIG. 4****FIG. 5****FIG. 6****FIG. 7**

SUBSTITUTE SHEET (RULE 26)

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US95/06199

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(6) :A61P 13/15

US CL :604/385.2

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 604/385.1, 385.2

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

NONE

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ---	WO, A, 93/02647, (PALUMBO ET AL.), 18 February 1993. See page 7 line 3 to page 9 line 1, page 9 line 16 to page 11 line 22, and figures.	1-8, 10-15, 17, 23, 24, 26 ----- 18, 25, 27-36
Y	US, A, 4,938,755, (FOREMAN), 03 July 1990. See column 15, lines 18-63.	8, 9, 15-17, 27-41

 Further documents are listed in the continuation of Box C.  See patent family annex.

* Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be part of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubt on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means		
"P" document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search

19 JULY 1995

Date of mailing of the international search report

04 AUG 1995

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US95/06199

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP, A, 2-142564, (OGURO HIROTAKA), 31 May 1990. See figures.	1, 7, 11, 13, 14, 22-24, 26
Y		8, 9, 15-21, 25, 27, 31-41
X	JP, A, 2-142565, (SAEKI TAKESHI), 31 May 1990. See figures.	1, 7, 11, 13, 14, 23, 24, 26
Y		8, 9, 15-21, 25, 27, 31-37, 39-41